IN THE CLAIMS

1. (Original) A magnetic resonance imaging magnet assembly comprising:

a primary coil including:

a first set of turns having a first prescribed number of turns about an axis, the first set of turns being symmetrically positioned radially from the axis and longitudinally with respect to a mid plane perpendicular to the axis;

a second set of turns having a second prescribed number of turns about the axis, the second set of turns being symmetrically positioned radially from the axis and longitudinally with respect to the mid plane outward of the first set of turns;

a secondary coil including:

a third set of turns having a third prescribed number of turns about the axis, the third set of turns being symmetrically positioned radially from the axis and longitudinally with respect to the mid plane in close proximity to the first set of turns and outward of the first set of turns; and

a fourth set of turns having a fourth prescribed number of turns about the axis, the fourth set of turns being symmetrically positioned radially from the axis and longitudinally with respect to the mid plane in close proximity to the second set of turns and outward of the second and third sets of turns;

wherein the first and third sets of turns are in a first prescribed turns ratio and the second and fourth sets of turns are in a second prescribed turns ratio.

2. (Original) The magnet assembly as set forth in Claim 1 wherein the first and second sets of turns are electrically connected together in series as a primary closed loop and the third and forth sets of turns and electrically connected together in series as a secondary closed loop.

3. (Original) The magnet assembly as set forth in Claim 1 wherein the first prescribed turns ratio is approximately 0.5 turns in the third set of turns per 100 turns

in the first set of turns.

4. (Original) The magnet assembly as set forth in Claim 1 wherein the second prescribed turns ratio is approximately 2.3 turns in the fourth set of turns per 100 turns in the second set of turns.

5. (Withdrawn) A method of optimizing the mutual inductance between a primary and a secondary coil in a magnetic resonance imaging actively shielded magnet assembly, the primary and secondary coils symmetrically positioned radially from a common axis and longitudinally with respect to a mid plane perpendicular to the axis, the method comprising:

minimizing deterioration in the homogeneity of the polarizing magnetic field for a given rate of change in the decay of the current in the primary coil; and

minimizing the rate of change of current in the secondary coil and a shim coil for a given drift in the current in the primary coil.

6. (Withdrawn) The method as set forth in Claim 5 wherein the change in the current in the secondary coil for a decay rate of 0.1 ppm/hour in the primary coil is less than 0.5 Amps/year.

7. (Withdrawn) The method as set forth in Claim 5 wherein a quadratic change in the homogeneity of the polarizing magnetic field along the axis, for a given rate of change in the decay of the current in the primary coil is less than 0.5 parts per million per year at a prescribed distance from the axis.

8. (Withdrawn) The method as set forth in Claim 5 wherein the rate of change in the polarizing magnetic field due to changes of current in the primary coil, the secondary coil and shim coils for a given drift in the current in the primary coil of 0.1 parts per million per hour is less than 0.105 parts per million per hour.

9. (Withdrawn) The method as set forth in Claim 7 wherein the prescribed distance from the axis is 22.5 centimeters.

10. (Original) A method of shielding a polarizing magnetic field in a magnetic resonance imaging actively shielded magnet assembly from external magnetic disturbances, the method comprising:

winding a primary coil about an axis, the primary coil including:

a first set of turns having a first prescribed number of turns about the axis, the first set of turns being symmetrically positioned radially from the axis and longitudinally with respect to a mid plane perpendicular to the axis;

a second set of turns having a second prescribed number of turns about the axis, the second set of turns being symmetrically positioned radially from the axis and longitudinally with respect to the mid plane outward of the first set of turns;

winding a secondary coil about the axis, the secondary coil including:

a third set of turns having a third prescribed number of turns about the axis, the third set of turns being symmetrically positioned radially from the axis and longitudinally with respect to the mid plane in close proximity to the first set of turns and outward of the first set of turns; and

a fourth set of turns having a fourth prescribed number of turns about the axis, the fourth set of turns being symmetrically positioned radially from the axis and longitudinally with respect to the mid plane in close proximity to the second set of turns and outward of the second and third sets of turns;

wherein the first and third sets of turns are in a first prescribed turns ratio and the second and fourth sets of turns are in a second prescribed turns ratio.

11. (Original) The method as set forth in Claim 10 wherein the first and second sets of turns are electrically connected together in series as a primary closed loop and the third and forth sets of turns and electrically connected together in series as a secondary closed loop.

12. (Original) The method as set forth in Claim 10 wherein the first prescribed turns ratio is approximately 0.5 turns in the third set of turns per 100 turns in the first set of turns.

13. (Original) The method as set forth in Claim 10 wherein the second prescribed turns ratio is approximately 2.3 turns in the fourth set of turns per 100 turns in the second set of turns.

14. (Original) A magnetic resonance imaging system comprising:

a magnet assembly including:

a primary coil including:

a first set of turns having a first prescribed number of turns about an axis, the first set of turns being symmetrically positioned radially from the axis and longitudinally with respect to a mid plane perpendicular to the axis;

a second set of turns having a second prescribed number of turns about the axis, the second set of turns being symmetrically positioned radially from the axis and longitudinally with respect to the mid plane outward of the first set of turns;

a secondary coil including:

a third set of turns having a third prescribed number of turns about the axis, the third set of turns being symmetrically positioned radially from the axis and longitudinally with respect to the mid plane in close proximity to the first set of turns and outward of the first set of turns;

a fourth set of turns having a fourth prescribed number of turns about the axis, the fourth set of turns being symmetrically positioned radially from the axis and longitudinally with respect to the mid plane in close proximity to the second set of turns and outward of the second and third sets of turns;

wherein the first and third sets of turns are in a first prescribed turns ratio and the second and fourth sets of turns are in a second prescribed turns ratio;

an operator console in communication with a computer system enabling an operator to control the production and display of images on a screen;

a set of gradient amplifiers for producing a set of magnetic field gradients in the magnet assembly

a system control unit in communication with the operator console, the set of gradient amplifiers and the computer system ;

a physiological acquisition controller receptive of signals from a patient positioned in the magnet assembly, the physiological acquisition controller in communication with the system controller; and

an interface system in communication with the magnet assembly and the system control unit, the interface system including:

a scan room interface and patient positioning system for positioning the patient within the magnet assembly; and

a transmit/receive switch for switching the magnet assembly to operate in a transmit or receive mode; and

a set of amplifiers in communication with the system control unit and the transmit/receive switch.

15. (Original) The magnet assembly as set forth in Claim 14 wherein the first and second sets of turns are electrically connected together in series as a primary closed loop and the third and forth sets of turns and electrically connected together in series as a secondary closed loop.

16. (Original) The magnet assembly as set forth in Claim 14 wherein the first prescribed turns ratio is approximately 0.5 turns in the third set of turns per 100 turns in the first set of turns.

17. (Original) The magnet assembly as set forth in Claim 14 wherein the second prescribed turns ratio is approximately 2.3 turns in the fourth set of turns per 100 turns in the second set of turns.

18. (Withdrawn) A method of shielding a polarizing magnetic field in a magnetic resonance imaging actively shielded magnet assembly from external magnetic disturbances while optimizing the mutual inductance between a primary and a secondary coil in the magnetic resonance imaging magnet assembly, the primary and secondary coils symmetrically positioned radially from a common axis and longitudinally with respect to a mid plane perpendicular to the axis, the method comprising:

minimizing deterioration in the homogeneity of the polarizing magnetic field for a given rate of change in the decay of the current in the primary coil;

minimizing the rate of change of current in the secondary coil and a shim coil for a given drift in the current in the primary coil;

winding a primary coil about an axis, the primary coil including:

a first set of turns having a first prescribed number of turns about the axis, the first set of turns being symmetrically positioned radially from the axis and longitudinally with respect to a mid plane perpendicular to the axis;

a second set of turns having a second prescribed number of turns about the axis, the second set of turns being symmetrically positioned radially from the axis and longitudinally with respect to the mid plane outward of the first set of turns;

winding a secondary coil about the axis, the secondary coil including:

a third set of turns having a third prescribed number of turns about the axis, the third set of turns being symmetrically positioned radially from the axis and longitudinally with respect to the mid plane in close proximity to the first set of turns and outward of the first set of turns; and

a fourth set of turns having a fourth prescribed number of turns about the axis, the fourth set of turns being symmetrically positioned radially from the axis and longitudinally with respect to the mid plane in close proximity to the second set of turns and outward of the second and third sets of turns;

wherein the first and third sets of turns are in a first prescribed turns ratio and the second and fourth sets of turns are in a second prescribed turns ratio.

19. (Withdrawn) The method as set forth in Claim 18 wherein the change in the current in the secondary coil for a decay rate of 0.1 ppm/hour in the primary coil is less than 0.5 amps/year.

20. (Withdrawn) The method as set forth in Claim 18 wherein a quadratic change in the homogeneity of the polarizing magnetic field along the axis for a given rate of change in the decay of the current in the primary coil is less than 0.5 parts per million per year at a prescribed distance from the axis.

21. (Withdrawn) The method as set forth in Claim 18 wherein the rate of change in the polarizing magnetic field due to changes of current in the primary coil, the secondary coil and shim coils for a given drift in the current in the primary coil of 0.1 parts per million per hour is less than 0.105 parts per million per hour.

22. (Withdrawn) The method as set forth in Claim 20 wherein the prescribed distance from the axis is 22.5 centimeters.

23. (Withdrawn) The method as set forth in Claim 18 wherein the first and second sets of turns are electrically connected together in series as a primary closed loop and the third and forth sets of turns and electrically connected together in series as a secondary closed loop.

24. (Withdrawn) The method as set forth in Claim 18 wherein the first prescribed turns ratio is approximately 0.5 turns in the third set of turns per 100 turns in the first set of turns.

25. (Withdrawn) The method as set forth in Claim 18 wherein the second prescribed turns ratio is approximately 2.3 turns in the fourth set of turns per 100 turns in the second set of turns.